

WHAT IS CLAIMED IS:

1. A method of making a sheet, useful for displays, comprising polymer-dispersed cholesteric liquid crystals, comprising the steps of:

(a) providing an emulsion comprising cholesteric liquid-crystal dispersed in a solution comprising gelatin and an effective amount of hardening agent for the gelatin;

(b) coating said emulsion over a substrate; and

(c) drying said emulsion to form at least one electro-optical imaging layer comprising polymer-dispersed liquid crystal domains dispersed in a matrix comprising hardened gelatin.

2. The method of claim 1 wherein said electro-optical imaging layer is open at the sides of the sheet.

3. The method of claim 1 wherein the substrate comprises a polyester material.

4. The method of claim 1 wherein the coating is dried to a thickness of less than 15 micrometers.

5. The method of claim 1 wherein the hardening agent is selected from organic compounds with aldehyde functional groups, blocked aldehyde functional groups, and active olefinic functional groups; inorganic compounds; and combinations thereof.

6. The method of claim 5 wherein the hardening agent is an organic compound selected from active olefins.

7. The method of claim 1 wherein said hardening agent comprises a vinyl sulfone compound.

8. The method of claim 7, wherein said vinyl sulfone hardening agent is represented by the formula:

$(\text{H}_2\text{C}=\text{CH}-\text{SO}_2)_n - \text{Z}$ wherein n is an integer with a value of 2 to 6 and Z is an organic linking group with a valence equal to n .

9. The method of claim 8 wherein Z is a heteroatom or an alkyl, alkylene, aryl, arylene, aralkyl or alkaryl group.

10. The method of claim 7 wherein said vinyl sulfone hardening agent is represented by the formula: $\text{CH}_2=\text{CH}-\text{SO}_2-(\text{CH}_2)_x-\text{SO}_2-\text{CH}=\text{CH}_2$ wherein x is an integer with a value of from 1 to 3.

11. The method of claim 10, wherein said vinyl sulfone hardening agent is bis(vinylsulfonyl)methane or bis(vinylsulfonylmethyl)ether.

12. The method of claim 1 wherein the emulsion in (a) is formed by combining a first stream of an aqueous solution comprising the hardening agent with a second stream of an emulsion comprising the cholesteric liquid crystal dispersed in a solution comprising said gelatin.

13. The method of claim 12 wherein the streams are subsequently flowed through means for forming a homogenous mixture of the combined contents of the streams.

14. The method of claim 13 wherein said means is a static mixer.

15. The method of claim 12 wherein the two streams are mixed together and coated before the crosslinking of the gelatin by the hardening agent is substantially completed.

16. The method of claim 1 wherein coating step (b) comprises

- (i) heating the emulsion to reduce the viscosity of the emulsion;
- (ii) coating the heated emulsion onto the substrate;
- (iii) lowering the temperature of the coated emulsion to change the state of the coated emulsion from a liquid to a gel state, thereby forming a coating characterized by a corresponding increased-viscosity state.

17. The method of claim 1 wherein step (c) comprises drying the coating, while maintaining it in the increased viscosity state, to form a coating in which domains of cholesteric liquid crystals are dispersed in a dried gelatin-containing matrix.

18. The method of claim 1 wherein the emulsion in (a) includes a surfactant and a biocide.

19. The method of claim 1 wherein the emulsion in step (b) is heated within a temperature range of between 20 and 50°C prior to coating.

20. The method of claim 16 wherein in step (iii) the temperature of the emulsion is lowered to be in the range of 5 and 20°C after coating.

21. The method of claim 1 wherein the gelatin concentration in the emulsion when coated is between 2 and 15 weight percent based on the weight of the emulsion.

22. The method of claim 1 wherein the ratio of liquid crystal to gelatin in the emulsion is between 6:1 and 0.5:1.

23. The method of claim 1 wherein between 80 and 95 percent by weight of water in the emulsion is removed from the coated emulsion during

drying in step (c) and wherein the wet to dry thickness ratio is between 3:1 and 10:1.

24. The method of claim 1 wherein the domains in the dried coating of step (c) has an average diameter of 2 to 30 microns.

25. The method of claim 1 wherein the emulsion is coated over patterned ITO conductors in step (b).

26. The method of claim 1 wherein the wet coating is 10 to 150 microns when first coated and 2 to 20 microns when dried.

27. The method of claim 1 wherein, after step (c), second conductors are formed, using printed inks, over the dried coating.

28. A display comprising;

- (a) a flexible transparent polymeric support;
- b) a patterned first conductor layer comprising transparent first conductors;
- c) a patterned second conductor layer comprising second optionally transparent conductors;
- d) an electro-optical imaging layer comprising cholesteric liquid-crystal domains dispersed in a matrix comprising hardened gelatin, disposed between the first and second conductors.

29. The display of claim 28 wherein the imaging layer is open on the sides.

30. The display of claim 29 wherein the display is a shelf label.